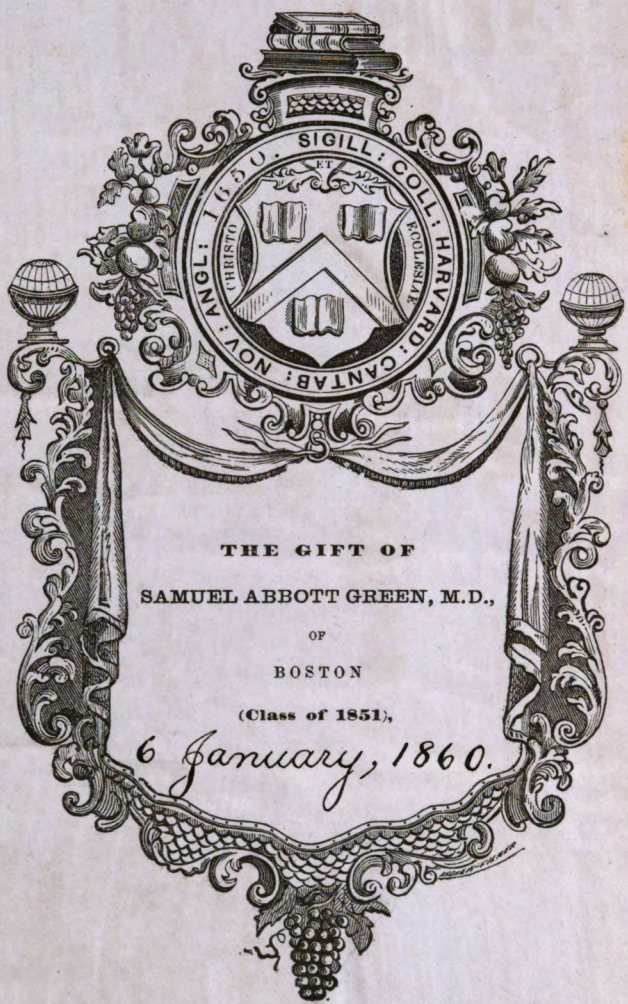

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A METHOD

OF

INCREASING THE YIELD OF THE MILCH-COW,

BY

SELECTING THE PROPER ANIMALS FOR THE DAIRY;

ACCORDING TO

GUENON'S DISCOVERY.

TESTED AND VERIFIED BY MANY YEARS OF OBSERVATION AND OF EXPERIMENTS.

IMPROVED AND SIMPLIFIED, AS CLASSIFIED AND ARRANGED,

BY JOHN NEFFLEN,

PRACTICAL AGRICULTURIST SINCE 1815, MEMBER OF TWO GERMAN STATE AGRICULTURAL SOCIETIES, AND OF THREE DISTRICT SOCIETIES; FORMERLY EDITOR OF THE FIELD AND GARDEN MAGAZINE, AND AUTHOR OF A MANUAL ON DOMESTIC ECONOMY.

With Seventy-eight Illustrations.

PHILADELPHIA:
C. B. ROGERS, No. 29 MARKET STREET:
AND FOR SALE BY
LIPPINCOTT, GRAMBO, AND CO.,
No. 14 NORTH FOURTH STREET.
1853.

At the request of Mr. John Nefflin, author of the present treatise, a Committee was appointed by the Philadelphia Society for the Promotion of Agriculture, for the purpose of testing the truth of Guenon's system, as simplified and arranged by Mr. Nefflin. The mode of investigation pursued by the Committee is detailed in the following report, which, by an extract from the proceedings of the Society given below, it will be seen was unanimously adopted.

REPORT

Of the Committee appointed to investigate the merits of Mr. John Nefflin's simplification of Guenon's method of testing the value of milch cows.

The Committee to whom was intrusted the examination of Guenon's system, very respectfully offer the result of their proceedings.

As the subject is one of great practical importance to the farmer, and no confidence in it can be created by vague generalities or isolated assertions on the part of those who may have given to it some attention, the Committee have endeavoured by personal observation to verify the published statements. The fortunate arrival in this country of a German farmer, Mr. Nefflin, has offered a most happy opportunity of developing the nature and character of Guenon's observations, and the mode in which an adept in the science proceeds in his examinations. More than forty cows were examined by this gentleman in the presence of members of the Committee. All the remarks of Mr.

Nefflin, all the questions and answers, were taken down at the moment by Mr. Arthur Cannon, phonographic reporter; and all his statements were compared with those of the owners of the cows. In this form and in this critical mode of proceeding, the Committee thought it possible to remove every doubt they themselves or others might feel in the truth of the system, and be enabled to offer to the Society and the agricultural community a clear and truthful history of this interesting discovery. After a full and particular investigation, carried on in the most searching manner, and sharpened by incredulity, the Committee have no hesitation in giving their adhesion, and expressing their concurrence in the views of Guenon. The precision and accuracy with which Mr. Nefflin describes the qualities of the animals, and the unhesitating manner in which he revealed all their properties, could not but impress the Committee with an entire reliance on his own skill, and a perfect confidence in the views of his teacher.

Still, though the Committee have no hesitation in offering this opinion, as the matter is one of the utmost importance, they deem it proper to recommend that if there remain any doubt on the part of the Society, as to the clear and complete demonstration of the truth of Guenon's observations, or if there are individual members who hesitate to concede the point, that the examinations should be continued until all scepticism, as far as possible, be removed.

A. L. Elwyn,
George Blight,
Isaac Newton,
John Wilkinson,
Samuel Williams,
Samuel C. Ford.

The following certificates from Messrs. Ford and Wilkinson, whose cows were examined by Mr. Nefflin, are presented for the purpose of conveying to the reader a clear idea of the method of examination, and of removing any doubts that might exist in regard to the practical application of the theory by every farmer. When it is remembered that Mr. Nefflin had no prior knowledge of the character of the cows submitted to his inspection (being an entire stranger in the vicinity of Philadelphia), these testimonies from gentlemen of the highest respectability, furnish most conclusive evidence of the value of the discovery, and should at once commend it to the earnest attention of the agricultural community generally.

MR. FORD'S STOCK.

1st Cow. "Is a bastard of the 3d class, 2d order, and is an excellently made cow; her milk is very rich, of which she will yield 16 qts., but she dries suddenly after becoming pregnant."

I certify the above is a correct report of the qualities of the above cow.

SAMUEL C. FORD.

2d Cow. "Is a bastard of the 3d class, 2d order, and has no mark; will calve about the 1st of March, a month prior to which time, she will suddenly decrease in her yield of milk; when not in a state of pregnancy is a good milch cow."

The same as regards this cow.

SAMUEL C. FORD.

3d Cow. "Is of the 4th class, 2d order; the escutcheon of the fork shape, though not so perfect as it ought to be; will give 15 or 16 qts. of milk; about 5 or 6

weeks after calving her yield is most plentiful; her milk is very good."

Correct in every respect.

SAMUEL C. FORD.

MR. WILKINSON'S COWS.

No. 1. "Belongs to the 2d class, and 2d order, and will yield 16 to 18 qts. per day. She has not the two oval marks distinct, or she would rank first class. She will hold her milk up to the time of calving.

No. 2. "Belongs to the 2d order, and 1st class, and would, if she was as large as No. 1, give 20 qts. of milk per diem, but as it is, should give 15 or 16 qts.

No. 3. "Belongs to the 2d class and 3d order." The examiner here remarked that he supposed that Mr. W. had been near 20 years in getting his herd to such perfection, to which Mr. W. replied that he had not owned a cow in his dairy more than 2 years and 3 months, but that he had selected them on this system.

It is due to Mr. Wilkinson to say that the examiner, after he had examined all his cows, acknowledged that in all his long experience with cows, he had not in his whole life seen so large a number of such highly marked cows in any herd, as he found in Mr. W.'s herd of 8. Many other facts which must have been highly gratifying to Mr. W. were mentioned, but are necessarily omitted.

CERTIFICATE OF MR. WILKINSON.

The description given of my cows by Mr. Nefflin, after he examined them by his improved Guenon system, is in the main very correct, and satisfies me that this is the only reliable system by which cows can be selected.

JOHN WILKINSON,

Mount Airy Agr'l. Institute, Germantown, Pa.

PREFACE.

In this small volume I offer to the American farmer a discovery, which, if carefully applied in the breeding of cattle, will be of great importance and of incalculable benefit to him. It will enable him to double, nay, in six or eight years to treble, the yield of his cows without increasing their number, bettering their food, or adding to their expenditure. It teaches the cattle-breeder the most infallible signs of a greater or smaller productiveness for the dairy; signs, which may be perceived in a calf not more than three months old. They indicate not only the quantity but also the duration of the yield, that is to say, they show how many quarts of milk a cow, when well fed, will give after calving, and how long this yield of milk will last or how soon the cow will go dry. The advantages which will accrue to the cattle-breeder from the knowledge of such signs are many. It will not only enable him to raise his stock to the greatest productiveness, but to sustain this productiveness at its greatest height. He will know what animals to purchase, what calves to select for breeding and which for fattening. This discovery is new in France and in the south of Germany, and but little known, as no popular pen has undertaken to place it within reach of the farming population in

a clear and comprehensible manner. So far, no farmer has been found, who, equally capable of managing the plough and the pen, has tried to introduce order and system into the large number of illustrations and degrees of productiveness which Guenon has described singly, and to separate the many superfluous descriptions of the numerous varieties from those which are actually necessary; still less has any one taken the pains of testing and verifying the theory of Guenon by profound study, years of experiments and observations. In every other country, and consequently in the United States, this discovery is still entirely unknown.

The present pages, the first which vouch for the correctness of this important and very profitable discovery, and which make it generally known, will prove what has been advanced above. The author moreover is prepared to establish its truth beyond all manner of doubt, by indicating the quantity and the duration of the yield of every cow, on examining any stock of cattle.

Here, I do not deem it superfluous to explain to the reader how far I am qualified to treat of this subject.

As early as 1815, I became possessed of a farm in the best and most fertile part of Wurtemberg. I devoted myself to an extensive system of agriculture, embracing the cultivation of the vine and of orchards. By degrees I commenced to raise several kinds of grain and plants of commerce, such as hops, madder, teazel, poppy, and millet, in which I was very successful. I also established a whiskey distillery, which produced fifteen gallons per diem, with which I connected a vinegar distillery. But my most successful undertaking was my cheese-dairy, which I commenced

in 1817; it consumed daily from 1500 to 1600 quarts of milk, partly the produce of my own cows, partly that of the establishments of my neighbours.

In the same year I became justice of the peace of the community of Pleidelsheim on the Neckar, in which office I continued for twenty-seven years, after which I resigned, with the intention of devoting my time, as I flattered myself, to a more quiet occupation, that of publishing a periodical and of carrying on farming on an extensive scale.

In the year 1823, the superiority of my farm was acknowledged by the government. I received a gold prize-medal and 20 ducats. Soon after I received the diploma as member of the Wurtemberg Agricultural Society, also that of the Baden Agricultural Society, and a year later, I was appointed President of the Agricultural Society of the Circle (District) of the Neckar. Elected representative for the assembly of the states in 1831, I was appointed on the committee of agriculture, and on that for the diminution of feudal taxes and tithes. In this capacity, and as editor of the "Field and Garden Gazette," I joined the opposition, and continued with the party, until on the 1st October, 1848, by a speech in the popular assembly at Heilbronn, the text of which I had taken from the Bible, and had changed to suit the times, "Render to Cæsar the things that are Cæsar's, to the people the things that are the people's, and what remains to the king," I had attracted the favourable notice of the government, which had become reactionary, to such a degree that they contemplated appointing me for a couple of years to a government situation in one of their prisons; but which, having been early apprised of their kind intentions towards me, I evaded by sudden flight.

In confirmation of the above facts, I hold in my hands printed and written certificates; but the most authentic testimonial will be found in Brockhaus's Conversational Lexicon of 1834, vol. 14, page 1004.

I do not refer to these testimonials of my agricultural and political career to gratify any feelings of vanity; but I do so as a duty towards the reader, to convince him that this volume does not contain any theoretical humbug, but thorough practical experiments and verified results.

I now offer this little work to the farmer, firmly convinced that sooner or later, if he applies the system contained therein, I shall be rewarded by his acknowledging that I have rendered him an essential service.

THE AUTHOR.

Philadelphia, October, 1852.

INTRODUCTION.

FRANCOIS GUENON was the son of poor parents in Libourne in France. Early left an orphan, he obtained employment as cowherd with a rich farmer. His vocation employed but little of his time, but instead of wasting it in idleness, he tried to occupy his mind by observing and comparing what was passing around him. Thus he had become acquainted with all the peculiarities, virtues, and vices of the animals intrusted to his care, according to their colour and the smallest marks of distinction; he soon know how much milk each of his cows gave, and how long they continued to give it, and was enabled to number and classify the animals according to their worth; but this was not sufficient for Guenon, he wanted to read their internal good qualities, on the outside. He was acquainted with the external milk-marks, but these, he found, did not always agree with the productiveness, seldom with the duration of the yield; consequently he continued his researches, and for this purpose selected the best cow and the worst. Thus he found the most general sign in the region between the two hind-legs from the udder upwards to the exterior of the female organs of generation. He now continued his researches and comparisons, and became daily more convinced that

here only the infallible signs of the yield of milk could be found.

Having stored his memory with a considerable number of well tested observations, and saved a sufficient amount from his wages to buy a single cow, he resigned his situation as cowherd, and commenced trading in cattle with one good cow.

As he brought none but good milkers into the market, and always gave satisfaction to purchasers, his reputation soon increased, as well as his profits, and he was enabled to make his purchases in distant parts.

During this time, his knowledge of the milk-marks became so much extended and confirmed, that he was enabled, though little accustomed to the use of the pen, to publish his experience in 216 parts, accompanied by 372 illustrations. The Agricultural Societies of Bordeaux and of Aurillac honourably acknowledged his merits.

In the year 1838, the publication of Guenon first fell into my hands. I translated it into German, and, assisted by the manuscript and the illustrations, I, together with several other able agriculturists of the neighbourhood, entered upon the testing of the theory of Guenon. This undertaking, however, was very difficult and very fatiguing, because Guenon had arranged his experiments according to the quantity of milk given by the cows, and had described each milk-mark separately, instead of arranging them in classes and omitting the marks of bad milkers.

This defect induced me, after ten years of trial and of experiments, to arrange the discovery of Guenon, without any essential alteration, into a system of classes and orders, more simple, more comprehensible, and more convenient for use.

Guenon called the above described region, by which the greater or smaller productiveness of the animal can be ascertained, by the significant name of "milk-mirror;" and a more appropriate appellation he could not have selected, as by the signs here impressed we can observe, as in a mirror, the hidden inward quantity of milk.

This milk-mirror is more perceptible during the summer than during the winter season, both in old and in young animals; the reason of this is that the hairs are finer and shorter, whilst the animals are fed on green fodder, particularly when they are kept very clean.

The hair of the horned cattle, as is well known, grows downwards, only in the milk-mirror, which (as we have said before), begins at the udder, the down-like, delicate, short, and *lighter*-coloured hair grows upwards; and where the ascending and descending hair meet, they form an elevated stripe, a vortex or whirl. This whirl is the real frame or border of the milk-mirror, and gives it its shape. This shape is the principal mark of the productiveness of the cow. One shape, when perfect, shows a greater abundance of milk than another; all of them may be divided into eight classes. In each class there are again varieties in the form of the mirror, as soon as propagation is allowed among animals of different classes, or with such as have irregular mirrors. This, in fact, is the cause of so many alterations in the mirror, and in the degrees of the productiveness down to the lowest quantity. The nearer an animal approaches the first order of its class, the less the milk-mirror deviates from the form of the class in its purity, and the less the productiveness diminishes. Thus each class has been divided into eight orders, to

exhibit its modification in the form and consequent smaller productiveness.

Finally, we have to notice the important circumstance, that the male animals have the same milk-mirror as the female animals, only somewhat smaller; and that, if we wish to keep the stock pure, we should select the bull from the same class as the cow, and if possible from the first, second, or third order. *When we have bulls of the first order, the breed may be gradually improved, until we raise the female animals to the first order of their class.*

This will suffice to show how immense are the advantages which result from the discovery of Guenon for the farmer or for the cattle-keeper in general. In the following pages, the method of obtaining and of improving these advantages will be explained. To obtain this object, we need in the beginning, until a thorough knowledge has been acquired, nothing but some attention and a little patience, two qualities with which the farmer must be born, and which he must cultivate, if he wishes to be successful in his business.

If the reader, notwithstanding the clearness with which the author has tried to explain himself in the following pages, should find doubts and difficulties, he is requested to apply either in person or by letter to the publishers, when the author will consider it a pleasure to answer any inquiries that may be made.

JOHN NEFFLEN.

PRODUCTIVENESS OF THE COW.

HERETOFORE the opinion of graziers and breeders of cattle has been that the productiveness of the cow depended upon certain breeds, and that, to increase the quantity of milk obtained, it was necessary to procure a certain breed famous as being good milkers. Farmers, therefore, frequently procured such a breed from a great distance and at considerable expense, without examining into the productiveness of the cattle, this being taken for granted, but looking principally to obtain young, fleshy, and well formed cattle: but only too frequently the purchaser was disappointed in his expectations. Perhaps the change of the climate, and the feed, diminished the quantity of the milk yielded before; but certainly the ignorance of a necessary correspondence between the milk-mirror of the male and female, must have contributed most to this decrease in the production of the milk.

The above assertion has been incontrovertibly estab-

lished by the discovery of Guenon, though cattle-dealers prefer to sell the well formed fleshy cattle at a high price, and keep the good milkers for their own families. It has therefore frequently happened that large farmers or agricultural societies, to increase the productiveness of their dairy, have sacrificed, nay, to tell the truth, have thrown away large sums of money for some famous breed; but still greater was the mistake, when, to obtain the object sought for, only fine bulls of a celebrated breed were procured. It must be admitted that in purchasing these, the increase of the production of the dairy was not the only object, for the advantages obtained by the rearing of cattle are threefold. The first consists in the profits of the dairy, the second in procuring durable draught animals, and the third in the rapid fattening of the cattle. Each of these objects may be more easily obtained with one breed than with another; but we must not imagine, that, where the principal advantage aimed at in the rearing of cattle is the increased production of the dairy, the other advantages become unattainable. For in every breed peculiarly adapted for draught and for fattening, there are excellent milkers, and their productiveness may not only be kept up, but may be increased, when we succeed in effecting the propagation by male and female animals, *which have the same milk-mirror, or which belong to the same class and the same order*.

This assertion, verified by a number of experiments, is the solid basis of the discoveries and doctrines of Guenon. It is true every rule has its exceptions, but when nature now and then deviates from her path, we should not hastily seek the cause in a defect of order, or attribute it to a mistaken experience and to deception.

It is a practically established fact, that defective feed, want of proper care, accidental diseases, but principally inflammation of the udder (Garget), and premature calving, interfere with the development of their productiveness for the dairy, interrupt the same if already established, and make its restoration impossible. Therefore such exceptions, the cause of which has never been properly examined, cannot overturn the well tested theory, that nature everywhere and at all times pursues her regular course, unless driven from it by some powerful obstacle and superior influence.

Guenon also had asserted, and the observations and experiments based upon his doctrines have proved beyond the power of contradiction, that the productiveness does not belong to any single breed of cattle, that in every breed we can find good milkers, and that consequently without detriment to the produce of the dairy or to the breed, crosses of different races may be admitted, as long as the animals intended for propagation belong to the same class, and in the order of the milk-

mirrors do not deviate too much; that is, when their mirrors resemble each other.

It is a well known fact that the great majority of the Dutch cows, according to their milk-mirror, belong to the first class; the Swiss cows, and particularly those of the Simmenthal, to the second and third class; the cows of the south of Germany to the fourth, fifth, and sixth class; and those from the Eastern Alps, between Bavaria, Austria, and Upper Italy, to the seventh and eighth class.

We find, however, in all these breeds predominating classes, with all the inferior orders, from the first to the eighth, consequently with all the irregularities and varieties, which, in this case as in others, are the result of inattention to the mirror in the selection of the bulls. But in the same parts we also meet with the other classes, alongside of the predominating ones, with all their irregularities more or less, which is another proof of the necessity of coupling mirrors, resembling each other as nearly as possible. But even when the pairing has been effected with the utmost care and according to rule, there is another important circumstance, which, although it cannot affect the forming of the mirror, may yet produce a very injurious influence upon the yield of the milk, and which therefore ought not to be overlooked. This is the age of the cows. According to our experience, the first and

second calf of a young cow will rarely yield as much milk as the third, fourth, and fifth, to the eighth; whilst the ninth and tenth fall off again. Guenon does not mention this subject, although I do not doubt that in his observations, through so many years, his experience corresponds with mine. Nor can I omit the result of my own experience here, that through laziness or want of skill in the milker, and through untimely yielding to the tricks of the cows, the productiveness may be diminished or the quantity of milk be reduced for ever after. The person intrusted with the milking may, through want of diligence or skill, in a short time reduce the yield of a cow considerably, if he does not attend to his business daily, at regular times (not sometimes too early and sometimes too late), and does not empty the udder clean, I might say to the very last drop. If once he leaves but the hundredth part behind, he will the next time undoubtedly obtain the two-hundredth part less, and in this manner he may, notwithstanding the best feed and the most perfect health of the animal, gradually reduce the quantity of the milk, until it yields from two to three quarts less than before. The unskilfulness of the milker, however, may further injure the productiveness. By roughly drying the teats, and by hard pressure upon them in drawing, he torments the cow, she becomes irritable and retains her milk as much as possible, and when laziness is

added to this, the yield of the milk will diminish rapidly and strikingly. We should also exert ourselves to obviate the vices of those cows, which, when they are milked, are uneasy or kick, and try to milk them perfectly clean by some method or other. The simplest and most effective means, known all over Turkey and in Greece, is, to tie a thin hempen cord, just before beginning to milk, round one of the hind legs of the cow, and best, round that one with which she tries to prevent herself from being milked, close to the body, *only once*, to draw it as tight as possible and to knot it. This unwonted tension will soon make the animal very quiet and docile, and the business of milking can be proceeded with, without any further obstacle.

Sometimes it happens that cows, after they have had the first calf, learn to suck their own udders, and accustom themselves to do so when the milker neglects to milk them clean, at short and regular intervals. This produces a painful tension in the lacteals, which urges the tormented animal to aid itself by drawing the milk. When this has become a vice or a habit, the simplest method of preventing it, is, to put round the neck of the cow a light collar which closes and opens at the lower point, by which she will be prevented from bending the neck sufficiently to reach the teats with the mouth.

I should not have mentioned these irregularities and

defects, which often occur in the rearing of cattle, if they did not tend to create doubts as to the discovery of Guenon, or to injure the latter irreparably in the opinion of some cattle-breeders. But in spite of all these and other unfavourable circumstances, the theory of Guenon remains firm and unshaken: the natural yield of milk can be known from the form of the milk-mirror; but it is equally true, that the milk-mirror produces no milk, and that it can never supply what has been lost by want of diligence and of skill, by scantiness of food, or by ill-treatment and disease of the milk-cow.

To show, however, the full value of Guenon's discovery of the milk-mirror, we shall here give a short description of the signs by which heretofore the yield of the cow was estimated, and submit them to a brief scrutiny. These marks or "points" are still recognised in France, in Germany, in Belgium, in Switzerland, and in England, but only in part. Nowhere are *all* the points or milk-marks known or recognised.

The following are considered as favourable milk-marks:—

a, a broad large mouth;

b, yellow or short or thin horns;

c, delicate, soft, short, and close hair;

d, broad, well spread ribs;

e, a broad chest;

f, a thin, long tail;

g, straight hind legs;

h, a regularly arched udder, covered with a short, close, silky down;

i, four teats of equal length and thickness;

k, thick projecting so called lacteal veins, which run along under the belly, from the udder, towards the fore-legs, forming a fork at the end, and finally losing themselves in a round cavity.

l, The milk-wart in the middle of the lower jaw, at the broadest part, nearer to the mouth than to the throat.

The more important of these points, are the five latter, from *g* to *l*. The others are less decisive.

The following are considered unfavourable milk-marks:—

a, long thick horns;

b, a long, narrow, pointed head;

c, a bull-like, puffy neck;

d, indented, pointed spine;

e, short, narrow ribs, not much bent;

f, a short, thick tail;

g, thin, long, bristly hair;

h, unequally vaulted udder, with a few long hairs;

i, teats of unequal length and thickness;

k, hind legs, like those of a goat, bent in the form of a sickle;

l, thin lacteal veins, almost imperceptible, without a fork, terminating in a point, and without any or with a very small and shallow indentation at the end (Milchschusselcher).

m, the milk-wart, when nearer the throat than the lower lip.

Among all these favourable and unfavourable signs, there is not one which by itself is decisive, but several of them must concur; besides this, they do not indicate the yield of milk, and still less the duration of this yield, from the time of calving to the period when the animal goes dry. Nor do we find in them any guide, not even a hint, what male animals are to be selected for the propagation, to sustain the productiveness of the breed, or to increase it by improvement. These defects are entirely removed by the milk-mirror discovered by Guenon, the truth and reliableness of which is most positively confirmed by the manner in which the milk-mirror of the first orders of each class agree with the heretofore known favourable marks of productiveness, and the less favourable and entirely unfavourable mirrors, with the known unfavourable marks or points. If therefore the marks, heretofore known, singly or several of them together, could be relied upon, which they can not, the milk-mirrors would still possess the great and important advantage over them, that they indicate not only the quantity of

the yield, but also its duration, while at the same time they point out the male animals, most suitable to sustain and to promote the productiveness in the after-breed. But the most important advantage is undeniably, that they enable us to ascertain, in the male and female animals, at the age of three months, the future productiveness for the dairy, or the capacity of sustaining this productiveness, and that consequently we are not obliged to feed and foster for years an animal with the uncertain hope that it will be a good milker, merely because the mother belonged to a good milking-breed. It can certainly not be denied, that the after-breed sustains undiminished the productiveness for the dairy, less generally than that it degenerates or diminishes in this respect; the reason of this is, that hitherto the absolute condition of a correspondence between a male and a female animal, for the preservation of the productiveness in the progeny, has been entirely unknown, and generally is so now, and that consequently no attention could be paid to it.

Having thus given, with the utmost brevity, a sketch of the unsatisfactory and unreliable marks of the productiveness of the cattle for the dairy, I shall now with more confidence proceed to communicate the discoveries of Guenon, the application of his theory, and the advantages arising therefrom.

I. THE COW.

1. *The Milk-Mirror.*

Guenon, as we have mentioned before, bestowed upon the new marks of the productiveness of the cow, the appropriate name of "*milk-mirror.*" From the time of his discovery, and during the twenty-five years of his observations and comparisons of these mirrors, and their secondary mark, he has collected so many varieties that their number amounts to from 200 to 300. This task no doubt was difficult and troublesome, but the second, to select from the large number of drawings the better qualities and their gradations down to the lowest, and to discover of each form the yield of milk and its duration, by an immense number of observations, was far more troublesome. An astonishing perseverance was requisite to fathom this secret and its varieties. To him belongs the merit of this very useful discovery. I, for my part, can only claim to have arranged the whole collection of Guenon's experiments into classes and orders, by which the general survey and the self-instruction is greatly facilitated, and the less instructed farmer, who, even when possessed of a clear understanding, has less leisure to travel into and through the large field of the discovery, is enabled to inform himself thoroughly, and to guard against errors and mistakes with but little trouble.

To attain this object, by which the discovery of Guenon will be most rapidly diffused, and thus become more generally useful, I have reduced the whole collection of Guenon's illustrations, according to their principal features, into classes, and the varieties into orders or suborders, according to the degree of their unfavourable signs of productiveness, but have passed over and set aside a number of degenerate varieties, which indicate an inferior degree of productiveness, because I considered it, for the keeper of cattle, much more practical to become acquainted with the more favourable marks, and to direct his attention more to the manner of increasing his yield of milk, than to the manner by which he cannot increase it. For, whoever is desirous of increasing the produce of his dairy, will only look for such milk-mirrors as indicate a larger yield, and will set aside all others which will point to the contrary, both in purchasing or in selecting calves for breeding. I can assure the farmer, that in this description and in the illustration, no milk-mirror has been omitted which indicates a profitable yield of milk. When, therefore, an animal is not possessed of one of these favourable milk-mirrors, he will know at once, how to act; the classes and orders to which these bad qualities and their forms belong, will give him but little trouble. He will be satisfied to become acquainted with the many, here described, less good

and entirely bad mirrors, and with their signs and qualities, for their number suffices to instruct him how great the variety which can appear in the breeding of cattle.

As to the qualities and form of the milk-mirror, we are obliged to make the following introductory observations, to enable us to treat the separate classes and orders with greater simplicity. The position of the milk-mirror is bordered by a frame of hair which grows upwards, and of such as grows downwards; it begins in the middle between the four teats, ascending between the thighs towards the vulva and the anus, as indicated in the table by the white spots on the coloured animals.

In the mirror itself the hair grows upwards, and on the remaining part of the body downwards. When the direction of the hair is not evident, we have only to pass the fingers over these parts to feel it.

The secondary marks, as well in the milk-mirror as those out of it, can be known, by the former growing *downwards*, and the latter *upwards*.

These secondary marks, *as well as their form and their position, do not reduce the mirror to another class, but merely to another order.*

The secondary signs and the single spots of the mirror, are marked by the following letters;

a, The greatest breadth of the mirror in all the classes and orders.

bb, breadth of the upper end of the mirror in the first class;

cc, ovals (O) above the teats;

d, a stripe of hair (I) below the vulva;

e, spots of hair (0 0), only in the first class.

ff, incisions (0 0) always at the lower part of the mirror.

g, ovals (●) in the middle of the mirror or bastard signs of the first class (see Bastard, in the Table).

hh, breadth of the mirror in the middle.

ii, escutcheon or small escutcheon (⬮) alongside of the vulva.

kk, ovals (●) alongside of the vulva;

ll, whirls (quirls) (0 0) alongside of the vulva;

m, height of the mirror of the third class;

nn, height of the mirror of the fourth class;

o, incision of the mirror of the fourth class, downwards;

pp, height of the mirror of the fifth class;

q, *r*, *s*, angle of the sixth class upwards;

t, height of the mirror of the seventh class;

uu, second bastard-mark of the first class, second division.

kk, and *ll*, the bastard-marks of the second, third,

fourth, fifth, sixth, and seventh class, first and second division.

The milk-mirrors I have divided into eight classes, according to their principal formations, and placed them in a line according to the productiveness which they indicate; so that the better stands under the first class, and the inferior under the eighth class.

The names of the classes indicate their form.

The first class is called	"lyre-shaped,"
the second	"selvage-shaped,"
the third	"hill-shaped,"
the fourth	"fork-shaped,"
the fifth	"club-shaped,"
the sixth	"square-shaped,"
the seventh	"wedge-shaped,"
the eighth	"shield-shaped."

Before entering upon the subject of the milk-mirrors and the qualities which they indicate, I shall give a general description of the good mirrors, which will at once convince every breeder of cattle, from the beginning of his self-instruction, and make him admit, notwithstanding all his knowedge of the breeding of cattle, he has never perceived or noticed these qualities.

We consider as good qualities in every breed and in every class;

1. A large mirror, having the same form on both sides;

2. Yellowish hair in the mirror, from which on rubbing with the finger, a yellowish branlike dust or dandruff appears;
3. Continuation of the mirror or of the same colour, and of the same hair *under the tail*, the further the better;
4. Close, fine, soft, silky hair in the mirror, on the udder, and in the secondary marks.

Bad Signs.

1. A small and irregular mirror;
2. Large secondary signs;
3. Coarse, bristly, thin hair in the mirror, on the udder, and in the secondary signs;
4. All the bastard-marks, as more particularly described below.

I shall now proceed to the description of the separate classes and orders.

A. THE CLASSES.

1st Class.

The form is lyre-shaped. The complete mirror commences in the middle of the four teats of the udder, which is covered with a short, fine down. It passes upwards over the whole back part of the udder, occupies the inner and outer surface of the thighs, and extends to *a a* (vide Tab. 1st Class 1st Order). Thence it curves

inward, rises to the anus 1½ to 2 inches wide on each side of the vulva at *b b*. Above the teats at *c c* we find two ovals, 2 inches in length by 1½ inch in breadth, with hair growing downwards. The inner part of the thigh upwards towards the vulva, is of a yellowish colour, with scattered black spots, where we find the bran or dandruff.

2D CLASS.

Selvage-shaped form. The mirror commences as in the first class, and ascends to the points *a a* (Tab. 2d Cl. 1st Ord.), thence the mirror descends somewhat on both sides and crosses inwardly to the points *h h*, which approach to the distance of 3 or 3½ inches. From the angles arises on each side a straight line, and continues upwards to the vulva, where they terminate, being from 1 to 1½ inch apart. The two ovals *c c* over the teats, are almost as large as those of the first class.

3D CLASS.

The mirror is hill-shaped; the beginning as in the first and second class (Tab. 3d Cl. 1st Ord.), but from the points *a a* it rises broader to *m*, to about 1 inch below the vulva. Ovals as in the 2d class.

4TH CLASS.

The mirror is fork-shaped, and the beginning as in

the foregoing classes. From *a a* (Tab. 4th Cl. 1st Ord.) it curves in on both sides to *n n*, and terminates in two points, about 3 inches below the vulva, turning in and running down to *o* in the middle, where the two lines meet again in a point, forming two horns or prongs. On the right and on the left side, we find two small escutcheons, *i i*, about 1½ inch long by ½ inch wide. Ovals as in the foregoing classes.

5TH CLASS.

The mirror is club-shaped, and the beginning as in the foregoing classes. From the points *a a* (Tab. 5th Cl. 1st Ord.), the mirror slopes across, rather downwards to *h h*, which two points approach within about 4 inches, hence it rises to *p*, 2½ inches broad, where it appears about 3 inches under the vulva, as if cut off. The broader and the higher this stripe is, or the nearer it approaches the vulva from *h h* to *p*, the better is the mark. On each side of the vulva there is an escutcheon *i i*, 2 inches long and ½ inch wide. Above the teats two ovals *c c*, 3 inches long by 2 inches broad.

6TH CLASS.

The mirror is of the form of a carpenter's square, and begins as the foregoing classes. At *a a* (Tab. 6th Cl. 1st Ord.), the lines on both sides run as in the 5th class, only somewhat deeper towards *h h*, and here ap-

proach each other within 3½ to 4 inches; hence, the lines rise on both sides to *k*, 2 inches under the vulva, perpendicularly; here the mirror forms a right angle and then rises again, somewhat narrower on the left side of the vulva, to the anus to *s*. The more the angle approaches the vulva the better is the mark. Above the teats ovals *c c*, from 3 to 4 inches long and 2 inches broad.

7TH CLASS.

The mirror is wedge-shaped, and its beginning as in the foregoing classes. From the point *a a* (Tab. 7th Cl. 1st Ord.), the lines, as in the 5th and 6th classes, turn in, to *h h*, to about three inches. Thence they rise on both sides, in such a manner, that they form a point, 2 inches below the vulva at *t*. On both sides, escutcheons *i i*, 2 inches long and ½ inch wide. The absence of these escutcheons indicates no smaller yield of milk. Above the teats two ovals, 3 inches long by two inches wide.

8TH CLASS.

The milk-mirror is shield-shaped, and is remarkable for its shape, which looks as if cut off by the horizontal line *a a*. (Tab. 8th Cl. 1st Ord.). The secondary signs *i i*, alongside of the vulva, with the hair growing upwards, are about 3 inches long and scarcely 1½ inch

broad. Above the teats ovals *c c*, as in the foregoing classes.

These are the eight principal forms, indicating the highest productiveness of the different classes or families, and, being perfect in their respective forms, belong to the first order of their classes.

The slightest deviation from these pattern mirrors and secondary marks places the milch-cows in the second order; and they descend into the third and fourth order, the more their form deviates from that of the first order of each class.

We now come to the orders, and shall only describe those particularly, the productiveness of which is sufficient to make the acquisition of the animals desirable, and with which an improvement in the breeding of cattle can be carried to the highest degree of perfection. For all other varieties we refer to the table, where the inferior qualities, which should be avoided or be removed from the breed, can be seen, together with the diminished quantity of the milk.

B. THE ORDERS.

1st Order, 1st Class.

This order has already been described in the first class; and we have only to add here, that the mirror indicates a daily yield of 20 quarts, and a duration of 9 months from the time of calving.

It is however to be understood, that the proportion of the quantity and of the duration depends upon the suppositions that

a, the milch-cows are of the same age, calculating from the third calf to the eighth.

b, the feed is good and strong, without being exactly fattening.

c, the care is regular, and that the milking is performed by industrious individuals.

d, the cow is sound, and that her yield has not been weakened by any former sickness, and

e, that she is not used for draught.

2D ORDER, 1ST CLASS.

The mirror is in form the same as that of the first order, only the extent is somewhat smaller in every direction. The ovals *c c* are narrower, and on the right side below the vulva is a stripe *d* (Tab. 1st Cl. 2d Order), about 2 inches in length and 1½ inch in breadth, with very short hair growing downwards.

Milk daily 19 quarts, duration 8 months from the time of calving.

3D ORDER, 1ST CLASS.

The mirror is like that of the 2d order, only rather smaller. It becomes regularly smaller, the further the order is removed from the first, of which, to avoid repetition, the reader will take particular notice, as a

general rule. Marks which distinguish this order from the first and second: a semicircular spot, the hair growing downwards *e* (Tab. 1st Cl. 3th Ord.), this spot joints the vulva in the form of a fork, and about 1½ inch below it, is rounded off with a breadth of 2 inches. The hairs are shining and white. Above the teats there is but one oval on the left side *c*.

Quantity 17 quarts a day, duration 7 months.

4TH ORDER, 1ST CLASS.

The points *a a* retire more towards the inner part of the thighs, the points *b b* approach *e* on each side to within a small half inch of the vulva. The mirror does not reach as high as the anus, but descends from the upper points towards the middle of the vulva. From here an oblong spot with whitish hair, which grows downwards, descends, terminating in two acute angles.

Quantity 15 quarts a day, duration 6 months.

5TH ORDER, 1ST CLASS.

The spot under the vulva covered with whitish hair, which grows downwards (Tab. 1st Cl. 5th Order), is from 5 to 6 inches long and 1 inch wide; the lower part of the mirror forms a half oval incision on the right side, 5 inches high and 1 inch deep.

Quantity 13 quarts a day, duration 5 months.

6TH ORDER, 1ST CLASS.

This order, on account of the small yield of milk, can no longer be recommended. Hair-spots as in the fifth order. On the lower part of the mirror *f f* (Tab. 1st Cl. 6th Ord.) we find on each side triangular incisions, 3 inches high and 1½ inch deep.

Quantity 10 quarts a day, duration 4 months.

7TH ORDER, 1ST CLASS.

The mirror deviates considerably from that of the sixth class at *a a* and *b b* (Tab. 1st Cl. 7th Ord.). The left half, it is true, rises as far as the vulva, but the right half, covered with bristly hair, is only half as high. Below the point *a* at *f* the right side bends in a little, and forms an angle with the broader lower half. Coarse, thinly scattered hair cover the udder.

Quantity 7 quarts a day, duration 3 months.

8TH ORDER, 1ST CLASS.

The mirror is entirely confined to the interval between the thighs, is narrow and irregular, some bristling hair appears on the left and the right without any order.

The bastards of this class we shall describe hereafter with those of the other classes; and now follows

1ST ORDER, 2D CLASS.

This has already been described under the 2d class.

Quantity 19 quarts a day, duration 8 months.

2D ORDER, 2D CLASS.

From *a a* (Tab. 2d Cl. 2d Ord.) the lines at *h h* incline more towards the middle, which renders the upper part of the mirror smaller than in the 1st order. On the left side of the vulva a small escutcheon 2 inches in length and ½ inch wide, with hair, growing upwards. The frame of the mirror is more glossy than the others. Over the teats only an oval *c* on the left side.

Quantity 17 quarts a day, duration 7 months.

3D ORDER, 2D CLASS.

From *a a*, (Tab. 2d Cl. 3d Ord.), the lines of the mirror curve upwards, towards *h h*, thence the latter ascends, as in the 2d order, but rather narrower to the vulva, on each side of which there is a small escutcheon *i i;* that on the left side is as large as that in the 2d order, but the left rather shorter. The oval *c*, smaller than in the second order, is also on the left side.

Quantity 15 quarts a day, duration 6 months.

4TH ORDER, 2D CLASS.

Straight lines ascend from *a a* (Tab. 2d Cl. 4th Ord.) towards *h h*, obliquely approaching each other towards the vulva. The two escutcheons *i i*, near the vulva, are also of unequal size, but longer and broader than in the third order. Here the oval *c* of the second

and third order is missing, and does not reappear in the following orders of the second class.

Milk daily 13 quarts, duration 4½ months.

The remaining orders need not be described here. The reader will understand the illustrations from what has been said before.

1st Order, 3d Class.

Quantity 19 quarts a day, duration 8 months. The remaining particulars have been mentioned under the third class.

2d Order, 3d Class.

On the left side, near the vulva, an escutcheon *i* (Tab. 3d Cl. 2d Ord.), ¼ inch in length and scarcely half an inch wide. An oval above the stripe *c* on the left side, somewhat smaller than in the first order.

Quantity 17 quarts a day, duration 7 months.

3d Order, 3d Class.

On each side of the vulva an escutcheon *i i* (Tab. 1st Cl. 3d Ord.) 3 inches long and ½ inch wide. Above the teats, to the left, a small oval *c*. The top *m* recedes further from the vulva in every new order.

Quantity 15 quarts a day, duration 6 months.

3d Order, 4th Class.

The mirror approaches nearer to the udder, and no longer ascends as high. Alongside of the vulva there

are two whirls *i i* (Tab. 3d Cl. 4th Ord.) longer and broader than the escutcheons of the preceding orders; the hairs bristle towards every side. At *a*, on the right side, an incision begins and continues to *f*.

Quantity 13 quarts a day, duration 4½ months. For the reasons given before, the remaining orders of this class will not be further described.

1st Order, 4th Class.

Quantity 17 quarts a day, duration 8 months.

2d Order, 4th Class.

The mirror is lower and narrower and the right prong, 1 inch shorter than the left *n n* (Tab. 4th Cl. 2d Ord.). The escutcheon on the left is as large as in the 1st order, but that on the right is only half as large. Above the teats an oval to the left. Quantity 15 quarts a day, duration 7 months.

3d Order, 4th Class.

On the left side of the vulva an escutcheon *i* (Tab. 4th Cl. 3d Ord.) and the right prong or horn of the mirror 1½ inch shorter than the left.

Quantity 13 quarts a day, duration 6 months.

4th Order, 4th Class.

Under the vulva a stripe *d*, (Tab. 4th Cl. 4th Ord.) the hair ascending, good 2 inches long, scarcely ½ inch wide; the right prong also 1½ inch shorter

than the left, and below *a* towards *f* an incision, 3 inches wide by 5 inches long.

Quantity 10 quarts a day, duration 5 months.

5TH ORDER, 4TH CLASS.

On the left side of the vulva a whirl *i* (Tab. 4th Cl. 5th Ord.) of ascending bristly hair, 5 inches long and 1½ inch broad. Under *a a* angular incisions *f f*. In all the remaining orders of this class the right prong appears shorter than the left.

Quantity 8 quarts a day, duration 4 months. For the further orders of this class, see the Table.

1ST ORDER, 5TH CLASS.

Quantity 17 quarts a day, duration 8 months.

2D ORDER, 5TH CLASS.

The lines from *a a* towards *h h* (Tab. 5th Cl. 2d Ord.) ascend a little. The two little escutcheons alongside of the vulva *i i* are unequal in size; the left resembles that of the first order, the right is as wide but only half as long. Above the teats an oval *c* on the left.

Quantity 15 quarts a day, duration 7 months.

3D ORDER, 5TH CLASS.

The corners *a a* (Tab. 5th Cl. 3d. Ord.) are more rounded, and recede from the thighs. On the left of the vulva, only one escutcheon *i*, a full inch long and

scarcely ½ inch wide. In this and in the following orders the oval above the teats is missing.

Quantity 13 quarts a day, duration 6 months.

4TH ORDER, 5TH CLASS.

From *a a* to *p* (Tab. 5th Cl. 4th Ord.) the mirror ascends, curving and growing narrower. Below *a* an incision as far as *f*, semicircular.

Quantity 10 quarts a day, duration 5 months. The remaining orders are illustrated in the Table.

1ST ORDER, 6TH CLASS.

Quantity 17 quarts a day, duration 8 months.

2D ORDER.

The square *q r* (Tab. 6th Cl. 2d Ord.) is at a distance of 3 inches from the vulva, and as this distance increases in the following orders, the more the stripe *r s*, on the left side, becomes elongated. Above the teats also an oval *c*.

Quantity 15 quarts a day, duration 7 months.

3D ORDER, 6TH CLASS.

The lines from *a a* to *h h* (Tab. 6th Cl. 3d Ord.) ascend rather obliquely, the square is 4 inches below the vulva, and gradually shortens in each following order.

Quantity 13 quarts a day, duration 6 months.

4TH ORDER, 6TH CLASS.

On the right side of the vulva a whirl *i* (Tab. 6th Cl. 4th Ord.), with ascending bristly hair, 3 inches long, and rather more than ½ inch wide. The stripe *r s* with spreading hair is broader than in the third order. Below *a*, on the right side, extending to *f*, we find an oblique angular incision.

Quantity 10 quarts a day, duration 5 months.

5TH ORDER, 6TH CLASS.

The stripe *r s* of the square *r k*, and the whirl on the right side of the vulva, have bristling hair spreading rather upwards. Incision as in the fourth order.

Quantity 8 quarts a day, duration 4 months.

For the remaining orders, see the Table.

1ST ORDER, 7TH CLASS.

Quantity 15 quarts a day, duration 8 months.

2D ORDER, 7TH CLASS.

The mirror rather shorter and smaller, and the two escutcheons *i i* (Tab. 7th Cl. 2d Ord.), on the sides of the vulva, shorter, but broader than in the first order. Above the teats an oval *c* to the left.

Milk daily 13 quarts, duration 7 months.

3D ORDER, 7TH CLASS.

The mirror smaller than in the 2d order, and the

escutcheon *i* (Tab. 7th Cl. 3d Ord.) to the left of the vulva 4 inches long and 1 inch wide. The point of the mirror is 5 inches from the vulva. No farther oval.

Quantity 10 quarts a day, duration 6 months.

4TH ORDER, 7TH CLASS.

Here we have only one escutcheon *i* (Tab. 7th Cl. 4th Ord.) to the left of the vulva, 7 inches long and 1 inch wide.

Quantity 8 quarts a day, duration 5 months.

When in the remaining orders, there are whirls with bristling hair, they are longer and wider than the escutcheons in the preceding orders.

For the remaining orders, see the Table.

1ST ORDER, 8TH CLASS.

Quantity 13 quarts a day, duration 8 months.

2D ORDER, 8TH CLASS.

The escutcheons *i i* (Tab. 8th Cl. 2d Ord.) to the right and to the left of the vulva, are dissimilar. The one on the left as large as in the first order, that on the right one inch shorter. Several, though not all the cows of this order, have below the vulva a stripe of ascending hair, which nearly reaches the vulva; it is 1½ inch long, and ¼ inch wide. An oval *c* is above the teats on the left side.

Quantity 10 quarts a day, duration 7 months.

3D ORDER, 8TH CLASS.

On the left side of the vulva an escutcheon *i* (Tab. 8th Cl. 3d Ord.) the hair of which rises as in a vortex, and is somewhat bristling; it measures from 4 to 5 inches in length, and 1 inch in breadth. Under *a* on the right side, there is towards *f*, an acute-angled incision, 6 inches broad and 7 inches deep.

Quantity 8 quarts a day, duration 6 months.

For the remaining orders see the Table.

THE BASTARD COWS

OF THE 1ST CLASS.

The cows of this class consist of two kinds. Those of the first kind have in the ascending hair of the mirror, between the thighs and between the vulva and the udder, an oval, formed of descending hair, *g* (Bastard Tab. 1st Cl. 1st Divis.), 3 inches long and 2 inches wide, of a whitish colour. The larger the oval, the sooner the milk will fail, and vice versa, the smaller the oval the longer the cow will give milk. But the early failing of the milk is a general rule. In every other respect the mirror is entirely like that of the first order of the first class.

The second kind of the bastards is distinguished by the hair of the mirror not ascending towards the vulva, but bristling like the beard of an ear of wheat, *w w* (Bastard Tab. 1st Cl. 2d Div.) and spread over the thighs from *a a* to *b b*. The broader the mirror and the finer the hair, the greater is the yield of milk, until the cow is again in calf; but when the hair is coarse, long, and thin, the yield is very small. The interior of the thighs to the vulva is somewhat reddish, the skin fine and soft, but there is no dandruff. All bastard cows of the first seven classes, of the first and second division, have above the teats two ovals *c c*.

2D CLASS.

These bastards are distinguished in every order by two ovals *k k* (Bastard Tab. 2d Cl. 1st Div.) as by two whirls *i i* (2d Div.) to the right and left side of the vulva; these marks are separate, an inch from the vulva; their length is 4 inches and their breadth 1¼ inch. When the marks are small and fine-haired, the milk fails more slowly; but when they terminate in two points and the hair is coarse, it turns watery.

3D CLASS.

These have escutcheons and whirls *k k* and *i i* (Bastard Tab.) as the 2d Class. The ovals are marks more favourable than the whirls; the larger both these

marks are, the smaller is the yield of milk; and the smaller they are, the more abundant the yield.

4TH CLASS.

Similar to the 3d class, pointing to the same qualities.

5TH CLASS.

The same as the 3d class.

6TH CLASS.

The broader and longer the oval *k* (Bastard Tab. 6th Cl. 2d Div.) or the whirl with spreading hair on the right side of the vulva, and the broader and longer the line *r s* on the left side, the greater is the degeneracy of the animals of this class in all its orders, and the smaller the quantity, goodness, and duration of the yield.

7TH CLASS.

The same as the 3d and 4th classes.

8TH CLASS.

These bastards have no mirror at all, and no hair growing upwards.

A few hints more for the breeder of cattle may not be superfluous.

Cows of extraordinary productiveness, of the first and second order, should be fed more carefully before and after calving. During this time rather the quality

than the quantity of the feed should be diminished, to avoid too great a flow of milk, or stagnation and consequent inflammation. It is therefore advisable to milk the cows, for some time, three times a day, every eight hours; after the first and second calving it may even be done four times, namely every six hours.

That no milk whatever may remain behind, it is necessary that a person, able and willing, should milk the cow quite clean, immediately after dropping the calf; that the calf should not be allowed to suck the cow, but that the milk from the cow should be put into a vessel, from which the calf will suck by means of a mouth-piece, until it gets accustomed to drink out of the vessel. The sucking of the cow by the calf has many disadvantages. When the cow has a sore udder, it will hurt her; when she gives a great quantity of milk, the calf will either take too much and fall sick, or it will not suck her clean, and the yield will diminish before you begin to milk her. Besides, the cattle-breeder cannot know how much the calf consumes as long as he is unacquainted with the yield of his cow; he cannot judge whether the calf receives too much or too little food.

In a large dairy, it is very advantageous to separate at once, the first half of the milk obtained from the second half, and to put it into separate vessels. The last half contains from 30 to 40 per cent. more butter.

The first milk will be used for common purposes, and the second for making butter.

II. BULLS.

The second, and not less important discovery of Guenon, is that the bull has the same marks as the milch-cow, only somewhat shorter and narrower. They differ, however, from those of the cow, by beginning behind the testicles, and terminating on the side of, or under, the anus. Guenon bestows upon these marks the same name "milk-mirror," which may be justified in as far as the bull has greater influence upon the sustaining or obtaining of an abundant yield of milk, as well as upon the improvement of the breed. For a good cow drops ordinarily one calf a year, whilst the bull can impregnate from sixty to a hundred cows annually. We shall therefore retain also for him the name of "milk-mirror." A number of experiments and trials have confirmed the statement of Guenon, that the yield of milk can only be sustained or improved by coupling the cow with a bull of the same class, bearing the same or better marks. It therefore becomes the duty of every cattle-breeder, to exercise the utmost caution in the selection of the bull-calves for the breed. It cannot be denied, that the cows which yield a great

deal of milk, and yield it long, are rarer than those which yield but little, and only for a short time. This disproportion is owing entirely to the mistakes in selecting bulls, for want of knowing the male marks or points.

Every cattle-breeder will rear the female calves of a very good milch-cow, as well for the dairy as for stock, and consequently, we frequently find from four to six descendants from a good milker in the same stall, but on asking whether these descendants, which externally resemble their mother, yield as much milk, we unfortunately hear the contrary, and are told that they degenerate more and more. This proves evidently that the bulls, with which the cows have been coupled, have belonged to another race (class and order), less productive for the dairy. But even when bulls and cows bear the same marks, it may sometimes happen that the bull and cow-calves are provided with inferior milk-mirrors. But such occurrences must not deter the cattle-breeder; he need not regret his selection, but continue assiduously both with old and young animals; for the good and bad qualities of the old ones frequently do not reappear until the second and third generation.

If the cattle-breeder will keep a genealogical register of his stock, such as sensible breeders of horses keep,

he will soon convince himself that in this case as in all others, perseverance alone will insure success.

Experience has confirmed the fact, that the more docile, the milder the appearance of the cow, the greater her usefulness; and it cannot be doubted that such a cow has descended, both on the male and female side, from a productive race. But if this is true, why should we not prefer the same mild, pleasing form, to a rough and wild appearance, in the bull? These qualities, however, have not been attended to heretofore, have not been preferred. Rather the contrary has been the practice, and we must not be astonished at the degeneration of the progeny of excellent races. It is nothing but a natural consequence: the good qualities of the mother were counteracted by the defects of the father.

The productiveness of the cattle for the dairy in a higher degree, is a quality which has been cultivated and improved. In the natural state, the demand for milk was limited to the wants of the young, and the yield of a cow, which we now call trifling, may at that time have sufficed, both in quantity and duration. According to the wise provisions of nature which we find everywhere, we must suppose that in a wild state no more milk was produced than was necessary for the health of the cow and of the calf, the same as it is with other animals. Gradually, as the horned cattle became domesticated, and as man undertook to provide

for their support, the yield of the milk increased; for we find to this day, that the greater the care which we bestow upon them, the more their productiveness will appear. The difference between stall-fed cattle, and cattle allowed to feed in the meadows, may be observed every day.

We may assert, without fear of being contradicted, that horned cattle, in their natural state, appeared wilder, than they do in their domesticated condition, and that consequently, care bestowed upon the selection of the bull will not only prevent degeneration, but contribute to the improvement of the stock. This observation is founded upon the milder and more docile appearance of bulls which are provided with good milk-marks, and which are not disfigured by a thick, puffy, lion neck.

An abundant yield of milk can therefore be already secured, by a careful selection, as soon as the bull-calves are three months old, or it may be obtained by the purchasing of bulls with good milk-marks. The improvement will be observable in the next generation, but will become more striking in the second. We find sometimes, though not often, and only by chance, bulls, with the best milk-marks, being at the same time perfect in body, having broad lines, a straight chine, straight legs, round thighs, vaulted ribs, a strong neck, a short square head, large eyes, and middling-sized well-formed horns. Another proof that the bull

has to contribute to the improvement of the breed of cattle or to the increase in the productiveness for the dairy, and that this, his avocation, is founded upon numerous experiments.

After thus having fully explained the good and bad qualities of the cow and of the bull, and having proved the necessity of their having corresponding milk-marks, we come to the last chapter.

THE CROSSING OF BREEDS.

Crossing is the coupling of male and female animals, provided with milk-marks from different classes or orders, as also of different races.

This crossing produces two kinds of results. *Animals, having similar milk-marks, but from different races, particularly when the male belongs to a better race, may be coupled without injury to the yield of the milk.* But crosses between different classes always produce unfavourable results, and more so when the bull belongs to an inferior order, or even to an inferior class.

Such pairing of the sexes will reduce the breed to a lower class or order; it may even cause a great disfiguration in the milk-mirror, and make a classification impossible, when, as a matter of course, it becomes impracticable to ascertain the order to which the animal belongs.

Advantages can only be obtained by the crossing of different breeds or races, when the mirrors of both animals correspond, or still better, when the mirror of the male belongs to a higher order.

If however the object of the crossing is to obtain a heavier stock of cattle, it is advisable rather to procure a male animal, which of course must be provided with the corresponding milk-marks. By this means the object of the crossing will be obtained sooner than by the purchase of a cow.

THE PERFECT BREED.

If the breeder of cattle, through a careful application of the above explained theory and rules, succeeds in uniting in one breed all the qualities we look for in cattle, in the highest state of perfectibility, his task is accomplished. With such a breed he will never part; it will be to him an inexhaustible mine, an everlasting treasure.

THE END.